New Ecphoras (Gastropoda: Thaididae: Ecphorinae) from the Calvert Formation of Maryland (Langhian Miocene)

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ABSTRACT

Three new ecphoras are described from the relatively unstudied Shattuck Zones 12 and 14 of the Plum Point Member of the Calvert Formation (Langhian Miocene) of Maryland. The new species, *Ecphora* (*Ecphora*) *chesapeakensis* n.sp., *Ecphora* (*Ecphora*) *turneri* n.sp., and *Ecphora* (*Trisecphora*) *scientistensis* n.sp., fill in gaps in the evolutionary lineages of the *Ecphora gardnerae* species complex, the *Ecphora choptankensis* species complex, and the *Ecphora* (*Trisecphora*) *tricostata* species complex, respectively.

Key words: *Ecphora*; Gastropoda; Calvert Formation; Miocene; Maryland.

INTRODUCTION

Since the publication of the "Field Guide to the Ecphoras" (Petuch, 1989), three new species of *Ecphora* Conrad, 1843 have been brought to my attention. These were collected in the relatively unstudied Beds 12 and 14 (Zones 12 and 14 of Shattuck, 1904:xxvii) of the Calvert Formation (Plum Point Member), along the Calvert Cliffs of western Chesapeake Bay, in Calvert County, Maryland. As the preservation of the molluscan fossils of Beds 12 and 14 is not good, the result of extensive leaching by groundwater, most specimens of upper Calvert ecphoras are collected in a fragmentary state. In spite of this difficult collecting of extremely fragile and shattered specimens, Mr. Joseph Turner of Baltimore, Maryland, through great diligence and patience, has managed to extract a number of unusual forms from these virtually unworkable beds. Through his generosity in the donation of numerous study specimens, I was able to determine that three ecphoras were new to science, and these are described here. This paper is considered an addendum to "Field Guide to the Ecphoras."

The three new species fill gaps in the evolutionary lineages of three main groups of ecphoras. One new species, here named *Ecphora* (*Ecphora*) *turneri* n.sp., is morphologically intermediate between *E.* (*Ecphora*) *wardi* Petuch, 1989 (figure 5) from Bed 10 of the Calvert Formation (Langhian Stage, Miocene) and *E.* (*Ecphora*) *choptankensis vokesi* Petuch, 1989 (figure 6) from Bed 16 of the Choptank Formation (Serravallian Stage, Miocene). Likewise, a new three-ribbed ecphora, here named *Ecphora* (*Trisecphora*) *scientistensis* n.sp., is intermediate between *E.* (*Trisecphora*) *eccentrica* Petuch, 1989 (figure 9) of Bed 10 of the Calvert Formation and *E.* (*Trisecphora*) *smithae* Petuch, 1988 (figure 11) from Bed 16 of the Choptank Formation. The third new species, here named *Ecphora* (*Ecphora*) *chesapeakensis* n.sp., is the oldest known member of the *E.* (*Ecphora*) *gardnerae* Wilson, 1987 species complex. This new ecphora is ancestral to *E.* (*Ecphora*) *williamsi* Ward and Gilinsky, 1988 (figure 2) from Bed 19 of the Choptank Formation, which previously had been thought (Petuch, 1989) to have been the original progenitor of the wide-ribbed *E. gardnerae* species group.

In this paper, I use the morphological criteria for ecphora species-level determinations that are outlined in my earlier works (Petuch, 1988, 1989). The holotypes of the new taxa are deposited in the invertebrate paleontology collection of the Florida Museum of Natural History, University of Florida, Gainesville, Florida, and bear UF numbers.

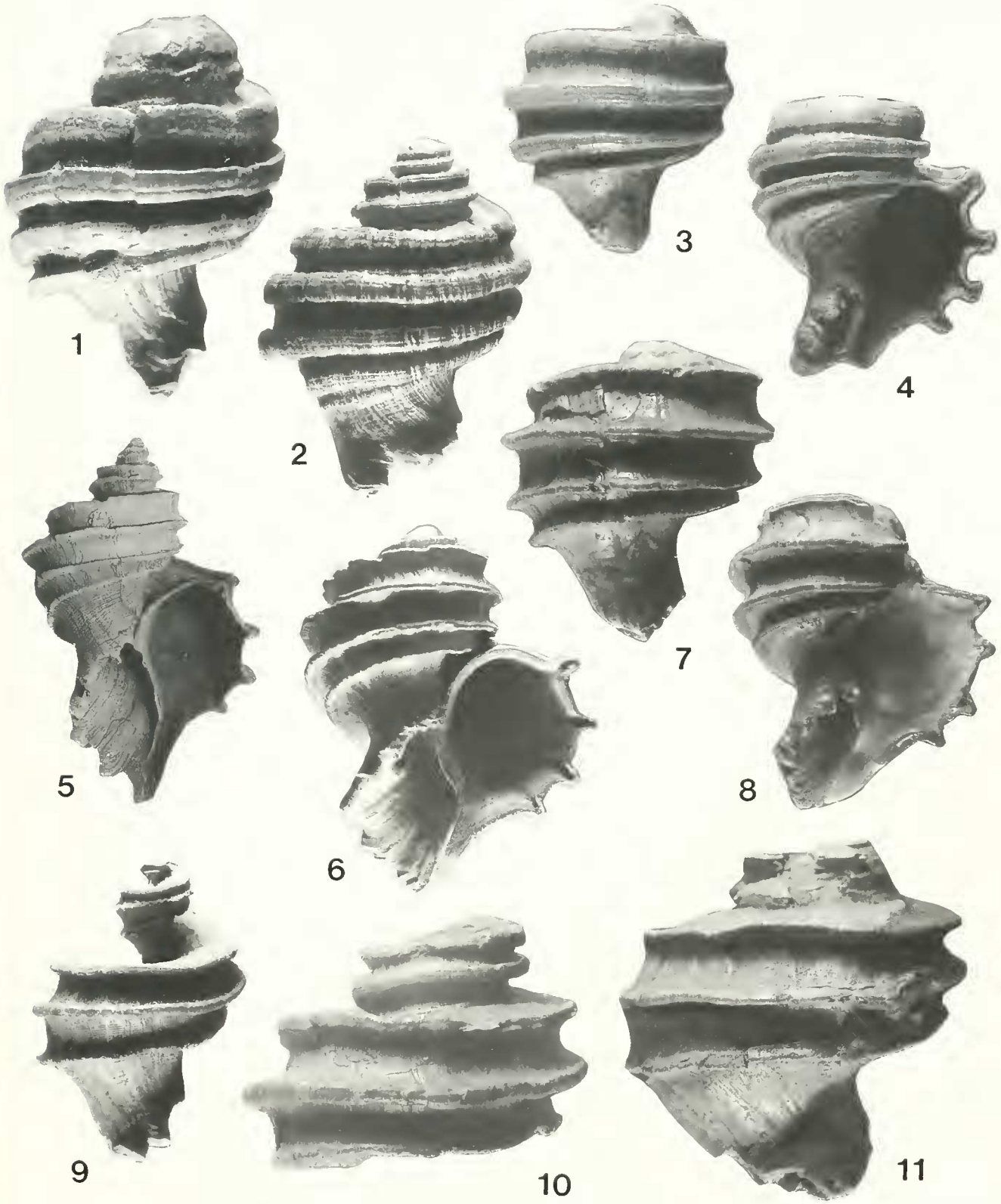
SYSTEMATICS

Class Gastropoda
Subclass Prosobranchia
Order Caenogastropoda
Superfamily Muricacea
Family Thaididae
Subfamily Ecphorinae Petuch, 1988
Genus *Ecphora* Conrad, 1843

Ecphora (*Ecphora*) *chesapeakensis* new species
(figures 3, 4)

Materials examined: *Holotype:* Length (incomplete and reconstructed) 28 mm, in Shattuck Zone 14, Plum Point Member, Calvert Formation, at Scientists Cliffs, Calvert County, Maryland, Chesapeake Bay, UF 23798; *Paratype:* length (incomplete and reconstructed) 35 mm, same locality as holotype, Petuch collection.

Description: Shell cylindrical in shape, slightly inflated; shoulder rounded; body whorl ornamented with 4 large,



Figures 1–11. Ecphoras from the Miocene of Maryland. **1.** *Ecphora* (*Ecphora*) *calvertensis* Petuch, 1988, dorsal view of 43 mm specimen, Shattuck Zone 12, Calvert Formation. **2.** *Ecphora* (*Ecphora*) *williamsi* Ward and Gilinsky, 1988, dorsal view of 57 mm specimen, Shattuck Zone 19, Choptank Formation. **3.** *Ecphora* (*Ecphora*) *chesapeakensis* n.sp., ventral view of holotype, length (incomplete) 28 mm, UF 23798, Shattuck Zone 14, Calvert Formation. **4.** *Ecphora* (*Ecphora*) *chesapeakensis* n.sp., ventral view of paratype, length (incomplete) 35 mm, Shattuck Zone 14, Calvert Formation. **5.** *Ecphora* (*Ecphora*) *wardi* Petuch, 1989, ventral

wide, rounded, adherent cordlike ribs that are slightly "T"-shaped in cross section; ribs sculptured with 1–4 thin, impressed spiral threads; shoulder rib largest and widest, curving upward (posteriorward) to produce canaliculate spire whorls; wide shoulder rib slightly incurved, producing distinctly rounded appearance; areas between ribs relatively smooth, with only few very fine spiral threads; siphonal canal well developed, ornamented with numerous large spiral threads; umbilicus narrow.

Etymology: Named for the Chesapeake Bay, which borders the type locality.

Discussion: *Ecphora chesapeakensis* is closest to *E. williamsi* Ward and Gilinsky, 1988 (figure 2) from the younger Choptank Formation, and appears to be its direct ancestor. The new species differs from its Choptank descendant in being a smaller, less inflated shell with thinner, less rounded ribs. The ribs of *E. williamsi* are lower and more adherent, while those of *E. chesapeakensis* project farther from the body whorl. Both species have similar wide, rounded, incurved shoulder ribs. *Ecphora chesapeakensis* is also similar to *E. calvertensis* Petuch, 1988 (figure 1) from Shattuck Zone 12, but differs in having distinctly rounded, cordlike ribs instead of the sharply-flanged, "T"-shaped ribs of the older Calvert species. This new ecphora constitutes a morphological link between the generalized *E. calvertensis* and the *E. gardnerae* species complex of the later Miocene. *Ecphora chesapeakensis* is confined to Shattuck Zone 14 (Bed 14, Calvert).

Ecphora (Ecphora) turneri new species
(figures 7, 8)

Material examined: *Holotype:* Length (incomplete) 38 mm, in Shattuck Zone 14, Plum Point Member, Calvert Formation, approximately 1 km north of Governor Run, Calvert Cliffs, Calvert County, Maryland, Chesapeake Bay, UF 21465, *Paratype:* length 44 mm, same locality as holotype, Petuch collection.

Description: Shell cylindrical in shape, with sharply angled shoulder; body whorl ornamented with 4 thin, narrow, bladelike ribs; edge of ribs rounded; subsutural areas flattened, producing stepped, scalariform spire; areas between ribs smooth, without spiral sculpture; siphonal canal elongated; umbilicus narrow but well developed.

Etymology: The taxon honors Mr. Joseph Turner of Baltimore, Maryland, who generously donated a large suite of research material from Shattuck Zones 12 and 14 of the Calvert Formation.

Discussion: *Ecphora turneri* is closest to *E. choptankensis vokesi* Petuch, 1989 (figure 6) from Shattuck Zone 16 of the Choptank Formation, but differs in being a much smaller, much more cylindrical and slender shell, with lower, less projecting ribs. The umbilicus of *E. turneri* is also much narrower than that of *E. choptankensis vokesi*, and the new species has a proportionally longer siphonal canal. *Ecphora turneri* is confined to Shattuck Zone 14 (Bed 14, Calvert).

Subgenus *Trisecphora* Petuch, 1988

Ecphora (Trisecphora) scientistensis
new species
(figure 10)

Material examined: *Holotype:* Length (incomplete, fragmentary) 29 mm, in Shattuck Zone 12, Plum Point Member, Calvert Formation, at Scientists Cliffs, Calvert County, Maryland, Chesapeake Bay, UF 23799.

Description: Shell cylindrical, slightly inflated in shape; shoulder sharply angled; subsutural area flattened, planar; spire whorls scalariform, stepped; body whorl ornamented with 3 large cordlike ribs; ribs rounded on edges, sculptured with 1 or 2 faint, shallow impressed spiral threads; areas between ribs smooth, without spiral sculpture.

Etymology: Named for the Scientists Cliffs, Calvert County, Maryland, the type locality.

Discussion: *Ecphora (Trisecphora) scientistensis* is closest to *E. (Trisecphora) eccentrica* Petuch, 1989 (figure 9) from Shattuck Zone 10 of the Calvert Formation, but differs in being a more cylindrical shell, by lacking fine spiral threaded sculpturing between the ribs, and by having a lower, adherent spire that does not become detached and uncoiled. The ribs of *E. (Trisecphora) scientistensis* are also thicker than those of *E. (Trisecphora) eccentrica*. The new species is also somewhat similar to *E. (Trisecphora) tricostata* Martin, 1904, also from Zone 10, but that well known species has wider ribs that are "T"-shaped in cross section and also has a more inflated, globose shell. *Ecphora (Trisecphora) tricostata*, like *E. (Trisecphora) eccentrica*, has detached, uncoiled whorls, while the whorls of *E. (Trisecphora) scientisten-*

view of holotype, length 70 mm, Shattuck Zone 10, Calvert Formation (taken from Ward and Gilinsky, 1988, plate 1, figure 4). **6.** *Ecphora (Ecphora) choptankensis vokesi* Petuch, 1989, ventral view of paratype, length 62 mm, Shattuck Zone 16, Choptank Formation. **7, 8.** *Ecphora (Ecphora) turneri* n.sp., dorsal and ventral views of holotype, length (incomplete) 38 mm, UF 21465, Shattuck Zone 14, Calvert Formation. **9.** *Ecphora (Trisecphora) eccentrica* Petuch, 1989, dorsal view of paratype, length 56 mm, Shattuck Zone 10, Calvert Formation. **10.** *Ecphora (Trisecphora) scientistensis* n.sp., dorsal view of holotype, length (incomplete, fragmentary) 29 mm, UF 23799, Shattuck Zone 12, Calvert Formation. **11.** *Ecphora (Trisecphora) smithae* Petuch, 1988, dorsal view of paratype, length 75 mm, Shattuck Zone 16, Choptank Formation.

sis are tightly coiled and attached. The new species is confined to Shattuck Zone 12 of the Calvert Formation (Bed 12, Calvert

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